

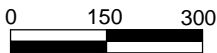
PHASE 1- BROWNS GULCH CHANNEL STABILIZATION CB RANCH BANK STABILIZATION PROJECT

LOCATED IN SECTION 5, TOWNSHIP 4N, RANGE 8W
LATITUDE = 46.1209 NORTH; LONGITUDE = 112.6218 WEST
SILVER BOW COUNTY, MONTANA

OWNER: CB RANCH
COOPERATING PARTNERS: MILE HIGH CONSERVATION DISTRICT & WATERSHED RESTORATION COALITION
MAY 24, 2012



2011 N.A.I.P. AERIAL IMAGE



VICINITY MAP

SHEET INDEX:

- C1 VICINITY MAP & SHEET INDEX
- C2 PROJECT LIMITS & EXISTING CONDITIONS
- C3 CROSS SECTIONS & CHANNEL CHARACTERISTICS
- C4 PROPOSED PLAN VIEW
- C5 BANK TREATMENT DETAIL & SPECIFICATIONS



DATE: 5/24/2012
CHKD: DB
DRAWN: TC
PROJ. No.: 0165492
PO Box 582 Livingston, MT 59047 (406) 222 7600

REV NO.	REVISION DESCRIPTION	BY	REVISION DATE

VICINITY MAP & SHEET INDEX

CB RANCH BANK STABILIZATION
ROCKER, MONTANA

SHEET

C1



PROJECT LIMITS
STATION 2+35 TO 2+65

N. BROWNS
GULCH RD

LIVESTOCK
CORRAL

ELEVATION
CONTROL

2004
X 5687.684
BM4

XS4
XS3
XS2
XS5
XS1

SURVEYED CROSS
SECTIONS

PROJECT
LIMITS



LOOKING UPSTREAM



LOOKING DOWNSTREAM

2001
X 5686.837
BM1

2002
X 5684.254
BM2

SURVEY CONTROL POINTS		
PT	ELEVATION	DESCRIPTION
BM1	5686.8370	REBAR AT BASE OF 8 X 10 FENCE POST. 150' NW OF CHANNEL
BM1	5684.2540	REBAR AT BASE OF 8 X 10 H-BRACE
BM3	5690.2310	REBAR AT BASE OF MOST EASTERLY H-BRACE POST
BM4	5687.6840	REBAR AT BASE OF MOST SOUTHERLY POST OF H-BRACE



DATE: 5/24/2012
CHKD: DB
DRAWN: TC
PROJ. No.: 0165492
PO Box 582 Livingston, MT 59047 (406) 222 7600

REV
NO.

REVISION
DESCRIPTION

BY

REVISION
DATE

PROJECT LIMITS & EXISTING CONDITIONS

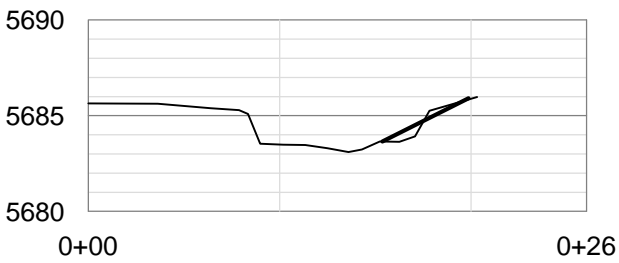
CB RANCH BANK STABILIZATION
ROCKER, MONTANA

SHEET

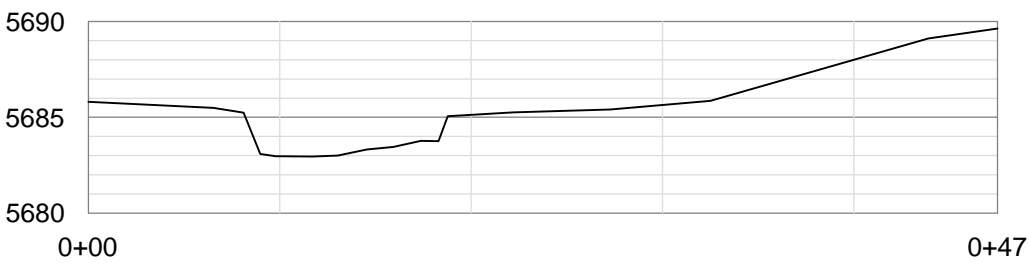
C2

PLOTTED: 5/24/2012 2:35 PM

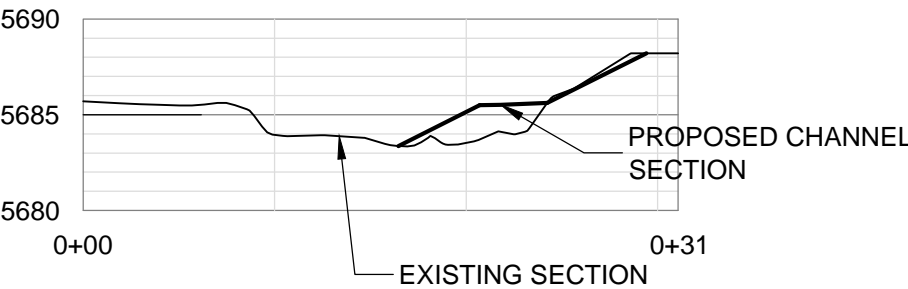
CROSS SECTION 1



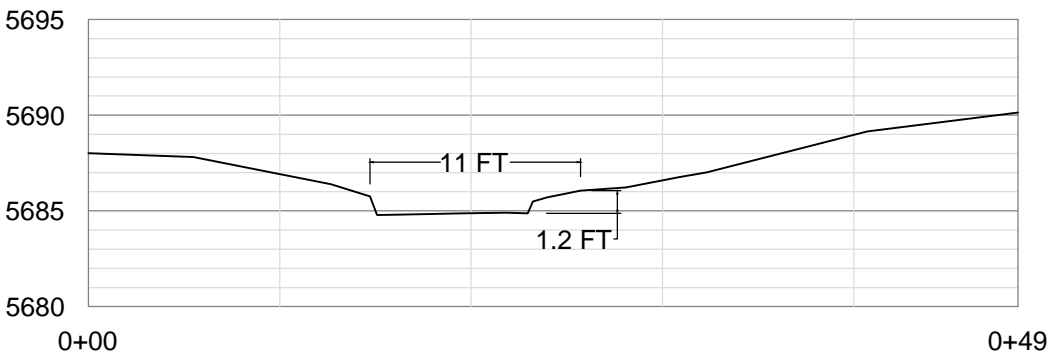
CROSS SECTION 5



CROSS SECTION 2



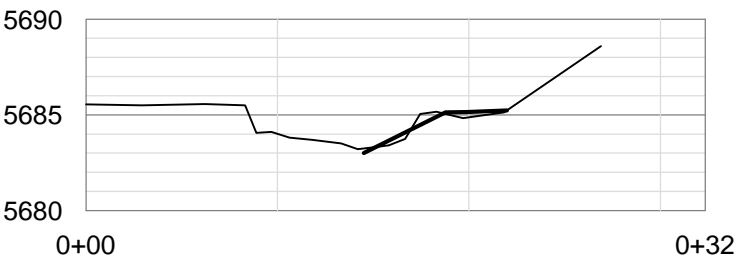
CROSS SECTION 6



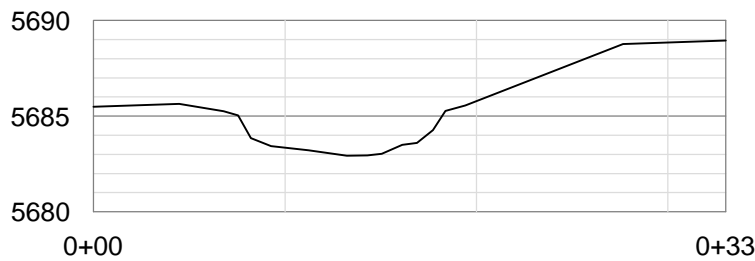
TYPICAL
SUBSTRATE
CONDITIONS



CROSS SECTION 3



CROSS SECTION 4



CHANNEL CHARACTERISTICS	
TOP WIDTH (FT)	10 - 12
AVERAGE DEPTH (FT)	1.0
WIDTH TO DEPTH RATIO	10 -12
D ₅₀ SUBSTRATE	GRAVEL
SINUOSITY	1.3
ENTRENCHMENT RATIO	1.7 to 2.2
SLOPE	0.0113
CHANNEL CLASSIFICATION - LOW W/D C4	

DESIGN FLOOD FREQUENCY	
Q ₂	50
Q ₅	94
Q ₁₀	129
Q ₂₅	178
Q ₅₀	217
Q ₁₀₀	257



DATE: 5/24/2012
CHKD: DB
DRAWN: TC
PROJ. No.: 0165492
PO Box 582 Livingston, MT 59047 (406) 222 7600

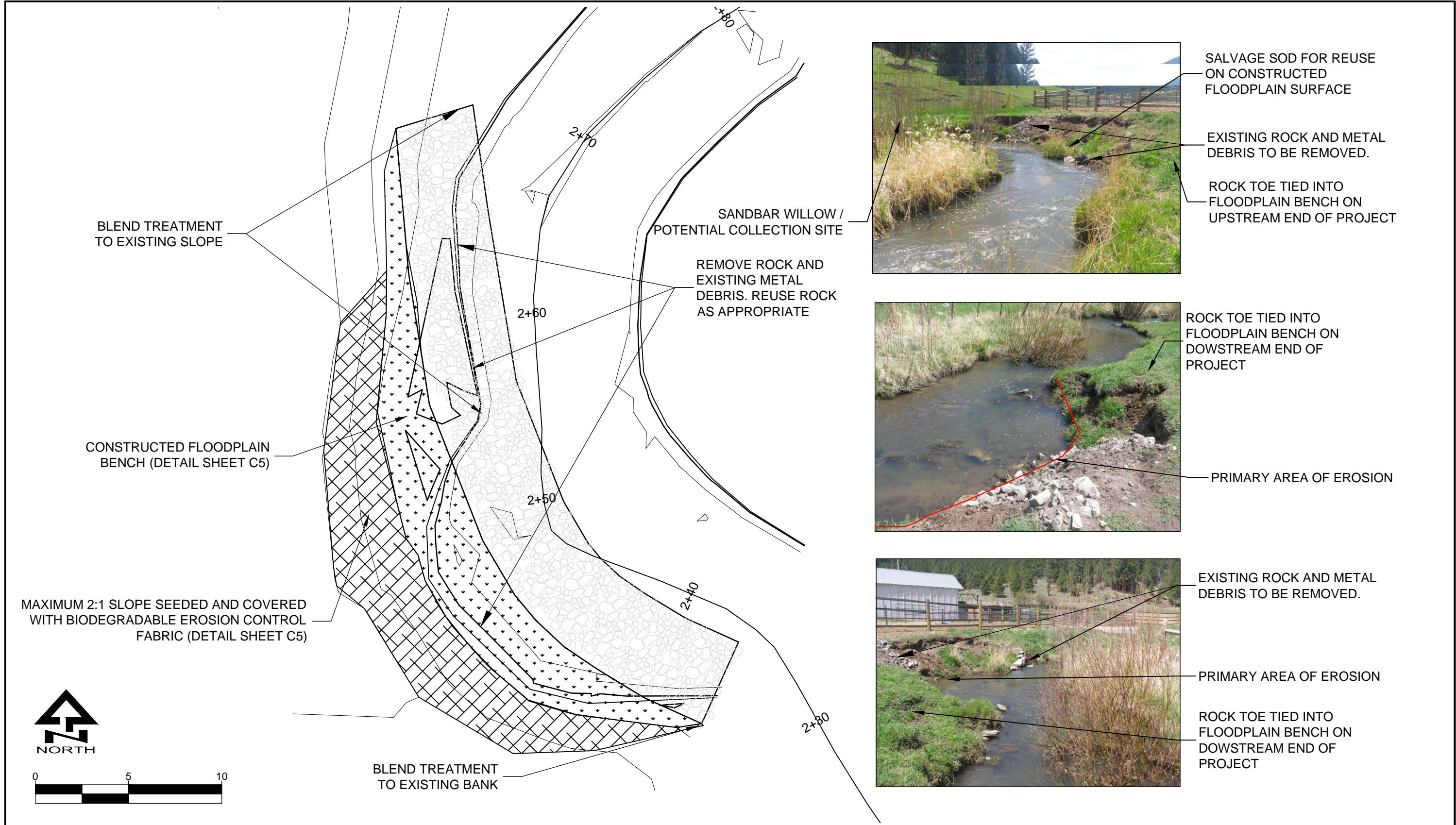
REV NO.	REVISION DESCRIPTION	BY	REVISION DATE

CROSS SECTIONS & CHANNEL CHARACTERISTICS

CB RANCH BANK STABILIZATION
ROCKER, MONTANA

SHEET

C3



DATE: 5/24/2012
CHKD: DB
DRAWN: TC
PROJ. No.: 0165492
PO Box 582 Livingston, MT 59047 (406) 222 7600

REV NO.	REVISION DESCRIPTION	BY	REVISION DATE

PROPOSED PLAN VIEW

CB RANCH BANK STABILIZATION
ROCKER, MONTANA

SHEET
C4

PLOTTED: 5/24/2012 2:36 PM

SPECIFICATIONS

ROCK FILL:

ROCK FILL MATERIALS SHALL BE ANGULAR TO SUBANGULAR AND APPROXIMATELY GRADED AS SPECIFIED ON THIS SHEET. THE WORD " APPROXIMATELY" IS INTENTIONALLY USED DUE TO THE REMOTE SITE AND ECONOMIC IMPACT OF HAULING MATERIALS FROM A DISTANT SOURCE. MATERIAL GRADATION THAT ARE SIGNIFICANTLY DIFFERENT THAN SPECIFIED SHALL BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.

FOLLOWING PLACEMENT OF OF THE ROCK FILL, SAND TO SMALL GRAVEL SIZED MATERIALS SHALL BE MECHANICALLY WORKED INTO THE ROCK MATRIX. THESE FINER MATERIALS SHALL BE WORKED INTO THE MATRIX OF LARGER PARTICLES AND REPEATED UNTIL THE ROCK FILL LIFT WILL NOT ACCEPT ANY MORE MATERIAL.

THE ROCK TOE FILL SHALL TERMINATE AT THE APPROXIMATE BANKFULL ELEVATION PLUS 0.5 FEET (5685.9' MSL).

FLOODPLAIN BENCH:

THE CURRENT CONDITION OF THE PROJECT BANK INCLUDES AN ERODED SCALLOPED AREA AND AN AREA WHERE ROCK AND METAL DEBRIS HAS LIMITED THE UPSTREAM EXTENT OF THE EROSION.

EXISTING ROCK AND METAL DEBRIS SHALL BE REMOVED AND DISPOSED OF PRIOR TO CONSTRUCTION THE PROJECT.

SPECIFIED ROCK FILL SHALL BE PLACED AT A MAXIMUM SLOPE OF 2:1 TO CREATE THE NEW BANK MARGIN. DIMENSION OF THE ROCK FILL SHALL BE AS SHOWN ON SHEETS C4 AND C5.

AFTER PLACEMENT OF THE ROCK TOE FILL THE AREA REMAINING BETWEEN THE ERODED EXISTING BANK AND THE NEWLY CONSTRUCTED BANK LINE MAY BE FILLED WITH EXCAVATED OR OTHER LOCALLY AVAILABLE MATERIALS UP TO THE FINISHED FLOODPLAIN BENCH ELEVATION (5685.9').

THE FLOODPLAIN BENCH SURFACE SHALL BE STABILIZED WITH TWO LAYERS OF BIODEGRADABLE EROSION CONTROL FABRIC. FABRIC SHALL BE STAKED WITH DIAGONAL CUT 18 INCH 2X4 SECTIONS ON 2 FOOT CENTERS.

UPPER BANK:

THE EXISTING UPPER BANK SLOPE SHALL BE GRADED AS NEEDED TO A MAXIMUM SLOPE OF 2:1. BIODEGRADABLE EROSION CONTROL FABRIC SHALL BE ANCHORED AND STAKED TO PROTECT THE SLOPE DURING VEGETATION ESTABLISHMENT.

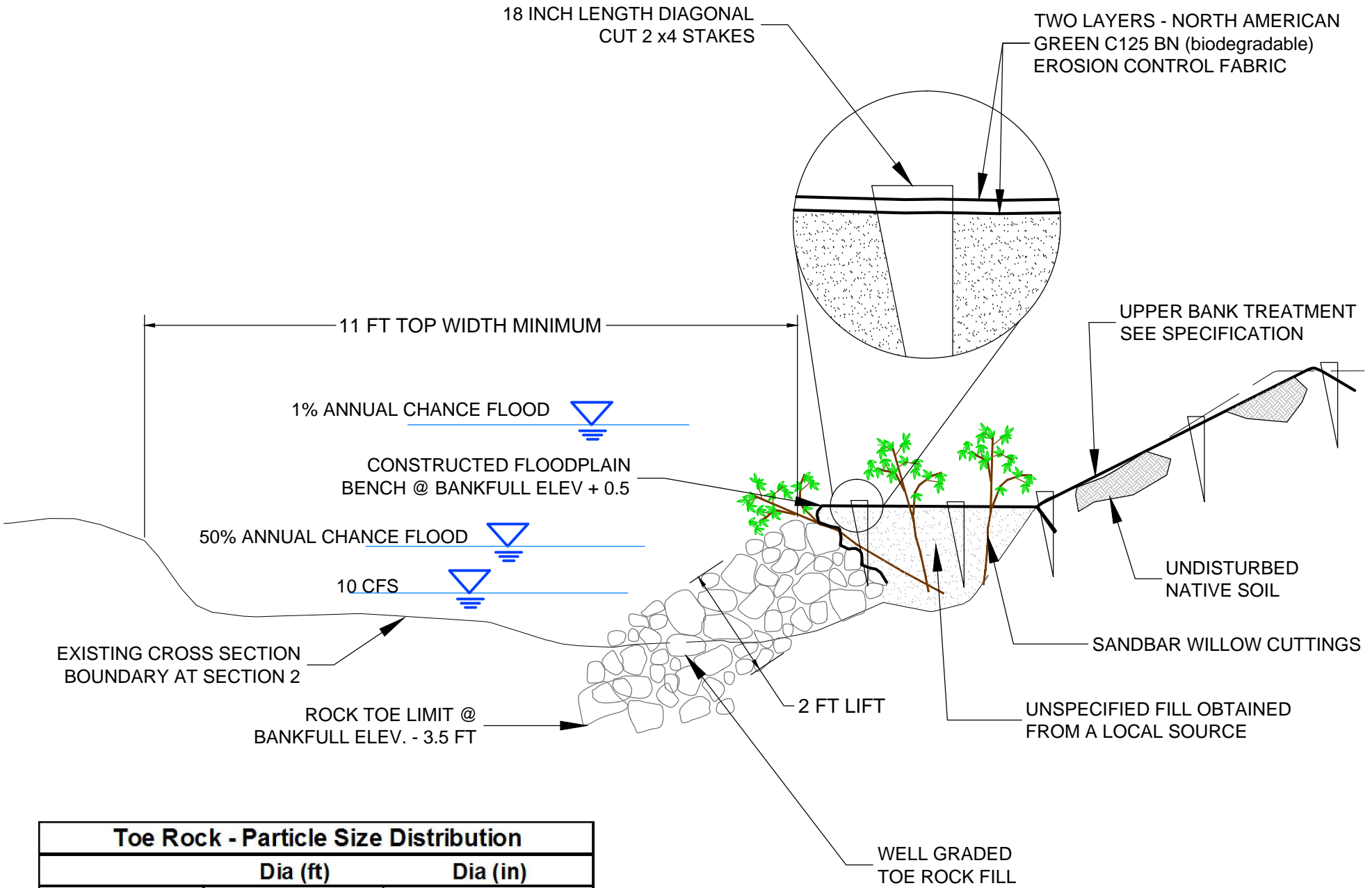
AN APPROVED NATIVE SEED MIX SHALL BE APPLIED UNDER ALL EROSION CONTROL FABRIC.

ESTIMATED EARTHWORK QUANTITIES		
Source/Destination	Material	Neat Volume (yd ³)
Sub-excavation / bank sloping (cut)	Small gravel / cobble to mineral soil	12
Constructed floodplain (fill)	Small cobble to mineral soil	5

CONSTRUCTION MATERIAL QUANTITIES		
Type	Size	Quantity
NAG C125 BN Erosion Control Fabric or equivalent	108' X 6.67' Rolls	1
Wood stakes	18" diagonal cut 2'X4's	50
Willow Cuttings	3' to 4'	30

GRADED ROCK QUANTITY		
Material	Total Weight (tons)	Neat Volume (yd ³)
Toe Rock Fill	24.0	15

1.8 tons / yd³



Toe Rock - Particle Size Distribution		
	Dia (ft)	Dia (in)
D _{min}	0.19	2
D ₁₅	0.38	5
D ₅₀	0.77	9
D ₁₀₀	1.15	14

1 BANK TREATMENT DETAIL
STATION 2+35 TO 2+65



DATE: 5/24/2012
CHKD: DB
DRAWN: TC
PROJ. No.: 0165492
PO Box 582 Livingston, MT 59047 (406) 222 7600

REV NO.	REVISION DESCRIPTION	BY	REVISION DATE

BANK TREATMENT DETAIL & SPECIFICATIONS

CB RANCH BANK STABILIZATION
ROCKER, MONTANA

SHEET

C5

PLOTTED: 5/24/2012 2:37 PM